

# CS402

## Introduction to Logic in Computer Science

### Coursework 1: Warming Up

Due on 13:00, 8 March 2016



#### 1 The Basic

Sherlock Holmes famously stated “Once you eliminate the impossible, whatever remains, no matter how improbable, must be the truth”. At the beginning of Spring 2016 term, someone committed the unthinkable crime of setting a coursework at the very first lecture. Holmes and Watson have four suspects:  $\{K(\text{Moonzoo}), R(\text{Sukyoung}), Y(\text{Shin}), Z(\text{Martin})\}$ , and evidence eliminated all but  $Y$ . Describe the application of the above rule of elimination to this case as best as you can, in the form of formal propositional logic.

#### 2 The Joke

Fill in the blank in the following joke.

Three logicians walked into a bar.  
The bartender asked: ‘do you all want beer?’  
The first logician said: ‘I don’t know.’  
The second logician said: ‘I don’t know.’  
The third logician said: ‘\_\_\_\_\_.’  
The bartender then served three pints of beer.

#### 3 The Valid

Represent each of the following in propositional logic, and decide whether it is valid or not.

- “You must be the criminal. I’m sure of this, because you walk with a slight limp. We all know that the criminal walks with a slight limp.”
- “We will be able to have class, only if either Shin brought his laptop, or there is a computer in the lecture room. There is no computer in the room. So we will not be able to have class. I say this, of course, because Shin forgot to bring his laptop.”

#### 4 The Proof

Prove the following:

- $P \leftrightarrow \neg Q \vdash \neg P \leftrightarrow Q$ ,
- $R \rightarrow \neg P, Q, Q \rightarrow (P \vee \neg S) \vdash S \rightarrow \neg R$ .

**Submit a hardcopy at the beginning of lecture on 8th March.**  
**Late submissions are not allowed.**